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Changes in Costs on Spring Wheat Farms in the Northern Plains

by James Vermeer

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CHANGES IN COSTS ON SPRING WHEAT FARMS
In the Northern Plains

by

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SUMMARY

In this report, cost data are used to measure the changes in costs of operating spring wheat farms in the Northern Plains, and the changes in costs of producing spring wheat on these farms. Data used in this report were obtained largely from the series of studies of costs and returns by types of farms. In estimating the costs of producing wheat, it was necessary to allocate to wheat a fair share of several items of overhead cost. In some instances, because no generally accepted method exists for distributing overhead costs, they were allocated in accordance with the best judgment of the author. A different allocation could have been made.

It is sometimes difficult to distinguish between necessary and actual costs. Some cost items were incurred because farmers had adequate incomes and cost reduction was not as important as convenience, or some other consideration. This report is based on actual costs as nearly as they could be determined.

Several measures of costs were used. Among these are costs per unit of production on an average farm as a whole and costs per bushel of wheat. Both kinds of costs are measured in terms of combinations of prevailing and normal yields and prices. Costs of production on tenant-operated farms are compared with similar costs on owner-operated farms. Because operator and family labor and land normally are residual claimants to gross income, several levels of charges for these services have been used to reflect various assumptions regarding returns to them.

Two groups of factors have had opposite effects on changes in costs on spring wheat farms since 1940. Continuously rising prices of goods and services used in production and the increasing proportion of these goods and services purchased from nonfarm sources have caused farm costs to rise at an accelerated rate. On the other hand, larger farms and increased efficiency in production through mechanization and other technological improvements have tended to hold down costs. The net effect has been an increase in costs per farm and in costs per unit of production. If allowance is made for the wide fluctuations in yields of crops caused by variations in weather, the increase in cost per unit of production has been less than the increase in prices paid.

From 1937-40 to 1947-49, costs of producing wheat and costs of producing other commodities on spring wheat farms rose at about the same rate. Since 1947-49, costs of producing wheat have risen much faster than costs of producing other commodities on these farms, largely because yields of wheat have not kept up with rates of production of other enterprises. In 1953-54, average costs of producing wheat on these farms ranged from $1.56 to $2.24 a bushel at normal yields, depending on how much of the cost of fallowing is charged to the wheat enterprise and on the level of charges made for use of operator and family labor and land.

Since 1947-49, costs of producing wheat on these farms have risen more than have prices received for wheat. Government support prices for wheat, however, have risen more than have costs of production.

Because many costs are incurred before farmers have a dependable basis for estimating production, most of the costs in one season are fixed regardless of the level of production obtained. Consequently, costs per unit of production are closely correlated with changes in production. Changes in production of wheat following Government programs that caused a reduction in the acreage of wheat affected the costs of production very little. Farmers were able to shift to production of other crops that used the same production resources. Thus they maintained their volume of production with little, if any, change in costs. Incomes probably were lower, however, because of shifts to crops of lower value.

Production practices have shifted from the use of farm-produced horses, feed, and labor to use of machines and materials from nonfarm sources. Because of this change, cash costs have risen relative to total cost. Also, total costs tend to be less flexible.

Data with which to measure the range in costs of production on individual wheat farms are not available. To obtain such estimates detailed records of production and expenses would need to be obtained and analyzed.

THE PROBLEM

In this study only the costs on one type of farm and the costs of producing wheat - the principal product of this type of farm - are considered. This is an exploratory analysis of the costs of operating farms and producing farm products in one segment of American agriculture.

Costs are affected, not only by prices paid for goods and services used in production, but also by changes in technology and volume of production per farm. Much of the cost of operating a farm is fixed or semifixed in the form of depreciation, interest, taxes, repairs, and operator and family labor and management. To the extent that these costs can be spread over a large volume of production, costs per unit are reduced.

This report presents an analysis of costs on spring wheat-small grain-livestock farms in the Northern Plains. In many respects, changes in costs on these farms are comparable to those on other spring wheat farms in surrounding areas where weather and methods of production are similar. However, the level of costs may differ because of differences in combination of enterprises, value of land, depreciation, other overhead costs, and volume of production.

USE OF COST DATA

Ordinarily, cost data serve three major purposes: (1) For use in estimating costs and incomes of operating farms under alternative operating plans; (2) as a basis for establishing prices of commodities; and (3) as a measure of economic change.

The first of these purposes - the budgeting of farm costs and incomes under alternative operating plans - is perhaps the most widely adopted use. For budgeting of this kind, partial costs often are as satisfactory as total costs. They provide a measure of the differences in costs and incomes among enterprises.

The use of cost data to establish a basis for support prices has been proposed more than once, but so far these data have not been accepted as a basis for price supports in the United States. The method has been used in some foreign countries with varying degrees of success.

Cost-of-production data are used in this report to measure economic change. Although the estimates were made in accordance with generally accepted procedures and as accurately as was feasible, the level of costs for this purpose is less significant than the changes in costs.

Farming systems, farm sizes, and farm technology change rapidly. Today, as a rule, more capital and less labor are used per farm than were used formerly. Production per farm, risks, and cash costs are greater as a result of these changes. In order to appraise adequately the problems with which farmers are faced as a result of these changes and to provide information for the formulation of agricultural policies and programs, the effects of these changes on farm production and costs by types of farm and by major enterprises on these farms must be known.

An analysis of costs sheds some light on several facets of economic change. For example, the increase in the proportion of goods and services used in production that comes from the nonfarm segment of the economy has reduced the flexibility of farm operating expenses. This change, combined with an increase in size of farms and a higher price level, has resulted in an increase in annual cash operating expenses.

Year-to-year changes in yields or prices frequently obscure the changes that have occurred in real costs or efficiency. However, a measure of changes in efficiency can be obtained by adjusting production and costs to the levels that would have been obtained with normal prices and yields. To a large extent, factors other than prices and yields are subject to control by farm operators. By assuming a normal relationship for prices and yields, most of the remaining changes in costs per unit of production can be attributed to changes in efficiency.

A large part of the cost of operating farms is made up of fixed costs - operator and family labor, taxes, interest on investment - which vary only slightly, if at all, with variations in total production. Changes in these fixed costs relative to variable costs have an important bearing on the production plans of farmers.

In addition to providing an analysis of costs at the level of the farm as a whole, the method used in this analysis lends itself also to the measurement of costs of enterprises and commodities comparable to measurement of total farm costs. Usually, farms are operated as combinations of enterprises. Farm policies and programs, on the other hand, usually are focused at the enterprise, or commodity level. An estimation of costs for the enterprise that is comparable to costs for the farm as a whole provides a link between the real basis of costs, the management firm, and the level at which policies and programs are aimed, that is, the commodity.

As the costs of any commodity rise relative to the price of the commodity, farmers may be expected to shift to production of other commodities for which cost-price ratios are more favorable. For example, preliminary analysis indicates that the ratio of costs to prices of cattle as a minor enterprise on wheat-small grain-livestock farms has been favorable relative to cost-price relationships in production of grain, and that as a result, production of beef cattle has expanded rapidly. Expansion of the beef cattle enterprise on these farms may be expected to continue until the ratios of costs to prices of cattle are more nearly in line with those of grain.

SOURCE OF DATA FOR THIS STUDY

This report is made up chiefly of an analysis of data from a series of studies of costs and returns by type of farm. These costs-and-returns series provide data on size, organization, yields, production, sales, and detailed expenditures and costs on average commercial family-operated wheat-small grain-livestock farms in north-central North Dakota. 1/ Unless otherwise indicated, the cost data presented in this report are based on owner-operated farms that are free of debt.

1/ For additional information concerning this series of studies, see Farm Costs and Returns, 1954, with Comparisons, U. S. Dept. Agr. Inform. Bul. 139, June 1955.

ALLOCATION OF COSTS

Data are available by enterprises for many items used in production, such as man labor and tractor work on each enterprise, seed used per acre, and feed fed per unit of livestock. For many other items, such as machinery other than tractors, taxes, insurance, motortruck and automobile use, it was necessary to develop a plan for allocating them to specific enterprises. The products of some "enterprises" such as pasture, service buildings, machinery, and horses are used entirely within the farm. Although the costs of these enterprises were included in total farm costs, no product was sold. Therefore, it was necessary to estimate the costs of these enterprises and to allocate the costs among the enterprises from which products were sold or for the products of which there is an established market and price.

THE NATURE OF COSTS

Costs incurred by farmers are not independent of the incomes that farmers receive. Costs of operating wheat farms in the Northern Plains rose rapidly from 1940 to 1954. During much of that time, incomes were rising or were at fairly high levels relative to costs. When incomes are high, farmers do not try to hold down costs to the extent that they do when incomes are low. They are likely to raise their "level of farming" as well as their level of living. Because the farm family, management, and the farm labor force are one and the same, farmers buy machinery and use production methods that make their work easier or more pleasant, even though less expensive machines and methods might be used. In addition, the hours of labor may be reduced somewhat.

A similar situation is found with changes in costs in other industries when business is flourishing and profits are high. Labor wants improved working conditions, higher wages, and shorter hours. Management is concerned with getting the work done with less labor, and if machines can do the work more cheaply than labor, machinery is substituted for labor.

The higher level of farming reflects a change in technology though not necessarily an improvement in efficiency. These changes in farmers' attitudes toward expenditures make it difficult to compare costs in periods of low prices and low incomes with other periods of high prices and high incomes. Also, in periods of high prices and incomes, it is more difficult to define costs.

Although one enterprise may be more profitable than others, farmers seldom shift entirely to a one-enterprise system. The combination of enterprises they choose is the one that they believe will give them the greatest return to resources under their control.

The return to labor and land used in a minor enterprise may be below the return to comparable resources used in the major enterprise, and the cost of the minor enterprise as usually computed may exceed the value of the product. Ordinarily, however, if costs are based on the return to labor and other resources that the operator is willing to accept (as opposed to no return from unused resources), they do not exceed the value of the product. Because the return to the otherwise unused resources that farmers are willing to accept differs from farm to farm, a cost that is comparable to price cannot be estimated. It can be assumed that the cost based on usual rates of performance and expected production does not exceed the value of the product if expected prices are realized.

Figure 1 shows the trend in gross income and operating expenses on wheat-small grain-livestock farms in the Northern Plains from 1930 to 1954. The difference between the two is net farm income. Operating expenses are only part of the costs on these farms, but they are the easiest to measure directly, and the costs on which agreement can be obtained most readily. Operator and family labor and management and use of capital also contribute to production and are important items in the total cost, but an acceptable measure of their value is more difficult to obtain. An estimate of the charges for these services also is shown in figure 1.

Normally these services receive remuneration in the form of net income. They are the residual claimants to the difference between gross income and operating expenses. In this analysis, however, labor and management of the operator and family are charged to the farm at the wage rates these persons would have received had they chosen to work on other farms. Only the actual labor used, not the labor available, is charged to the farm. Use of capital charged to the farm is computed by multiplying the value of the assets by the interest rate on loans that normally would be secured by similar assets. Some theoretical weaknesses are inherent in this method of computing labor and capital costs. Other methods could be used. These are discussed in greater detail later in this report.

From 1941 to 1954, cash inputs (costs at constant prices) used on spring wheat-small grain-livestock farms remained at a little more than half the total inputs (table 1). The quantity of goods and services bought or hired increased by about 18 percent, but the size of farm and the amount of capital used increased about as much. During this period, the amount of labor hired decreased, but goods and services from nonfarm sources, such as machinery, fuel, herbicides, telephone, and electric service, increased in importance. Goods and services from nonfarm sources valued at constant prices comprised 43 percent of total costs in 1952-54, compared with only 34 percent in 1941-43.

Prices of goods and services from nonfarm sources also are more rigid than prices of feed, seed, and livestock, or wages of farm labor. Consequently, as nonfarm goods make up a larger proportion of total cost items today than formerly, any decline in production or prices received by farmers in recent years has depressed net income more than in earlier years when these items were not so important in farm production.

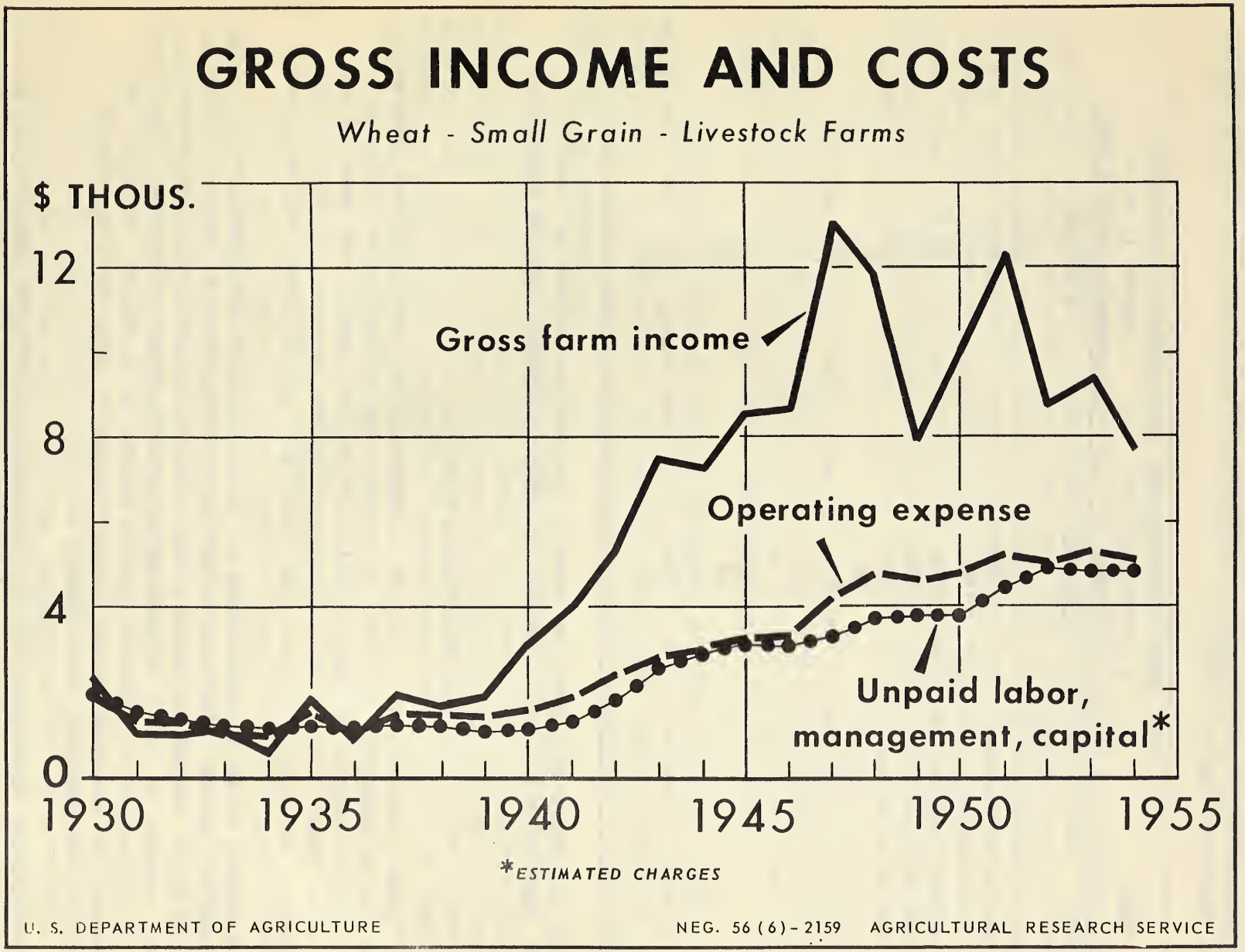

Figure 1.- Operating expenses represent only about half of total costs of production. Estimated charges for operator and family labor, management, and capital are almost as great. Over a period of years gross income must cover all these costs if farmers are to remain in business.

Table 1.-Cash expenditures and items purchased from nonfarm sources as a percentage of total costs, 1947-49 prices, wheat-small grain-livestock farms, Northern Plains, 1941-54

Year	Cash inputs 1/ as a percentage of total	Nonfarm-produced inputs 1/ as a percentage of total
	Percent	Percent
1941	52	33
1942	52	34
1943	51	35
1944	51	35
1945	52	37
1946	52	38
1947	56	41
1948	57	42
1949	54	41
1950	55	43
1951	54	44
1952	52	43
1953	54	44
1954	52	42

1/ Inputs are goods and services used in production valued at constant prices and cost rates. In this instance, 1947-49 average prices were used.

TYPES OF COST MEASURES

Different measures of costs may be appropriate for different purposes. Farm costs can be measured in terms of direct cash expenditures only, or they may include charges for depreciation of capital goods that must be replaced at some time in the future. A more complete measure of costs would include charges for use of capital and those for unpaid labor and management.

One method of estimating costs is to value these goods and services in terms of current prices. Another method is to value them in terms of constant prices which serves to measure the relative importance of the several factors and changes in their relationships over a period of years. Also, cost per unit of production at constant prices serves as a measure of efficiency. More important, it serves as a measure of change or lack of change in efficiency with technological development.

In measuring costs per unit of production, divergent results can be obtained, depending on whether actual yields and rates of production or average or normal yields are used as the denominator. Cost can be computed for the farm as a whole or for each enterprise on the farm. Enterprise costs are

less defensible than costs for the whole farm because no generally accepted method exists for allocating some overhead costs or joint costs.

CHANGES IN FARM COSTS OVER TIME

Since 1935, three major factors have influenced the changes in total costs and costs per unit on wheat-small grain-livestock farms. These are: (1) Higher prices paid for goods and services; (2) higher crop yields; and (3) larger farms. In the Northern Plains only the third factor is controlled to any extent by farmers. Operating expenses have risen slightly more than the total of charges for operator and family labor and management at hired labor rates and for the use of capital at prevailing interest rates. A fourth factor, which has retarded the advance in costs, has been the increase in efficiency of production. This is related to the increase in size of farm.

Changes in crop yields from the 1930's to the 1940's and 1950's were large and caused wide fluctuations in total farm production, but they have affected total farm costs very little. The volume of goods and services used in production has varied much less than crop yields, (fig. 2).

Increase in size of farm as measured by total inputs - land, labor, machinery, and other goods used in production - has helped to push up total costs per farm. However, to the extent that farms have become more efficient as they have grown larger, the increase in size has served to hold down costs per unit of production.

Change in total inputs is perhaps the best measure of change in size of farm. It reflects not only the change in acreage but also the change in the use of labor, and of capital invested in livestock and equipment, operating expenses and depreciation of machinery, and feed purchased for livestock. Increases in most of these factors in recent years were offset to some extent by a decrease in the amount of labor used.

Dollar Costs

As shown in figure 2, year-to-year changes in total inputs usually were small. On the other hand, variations in production on these farms have been large. Variations in production on spring wheat farms in the Northern Plains have been as great or greater than on other types of farms. As a result, cost per unit of production has varied greatly also.

Figure 3 shows total cost and operating expenses per unit of production. These costs were very high in 1934 and 1936, mainly because of low production. They were low during the early forties, largely because of the higher crop yields during this period, while prices paid for goods and services were still relatively low.

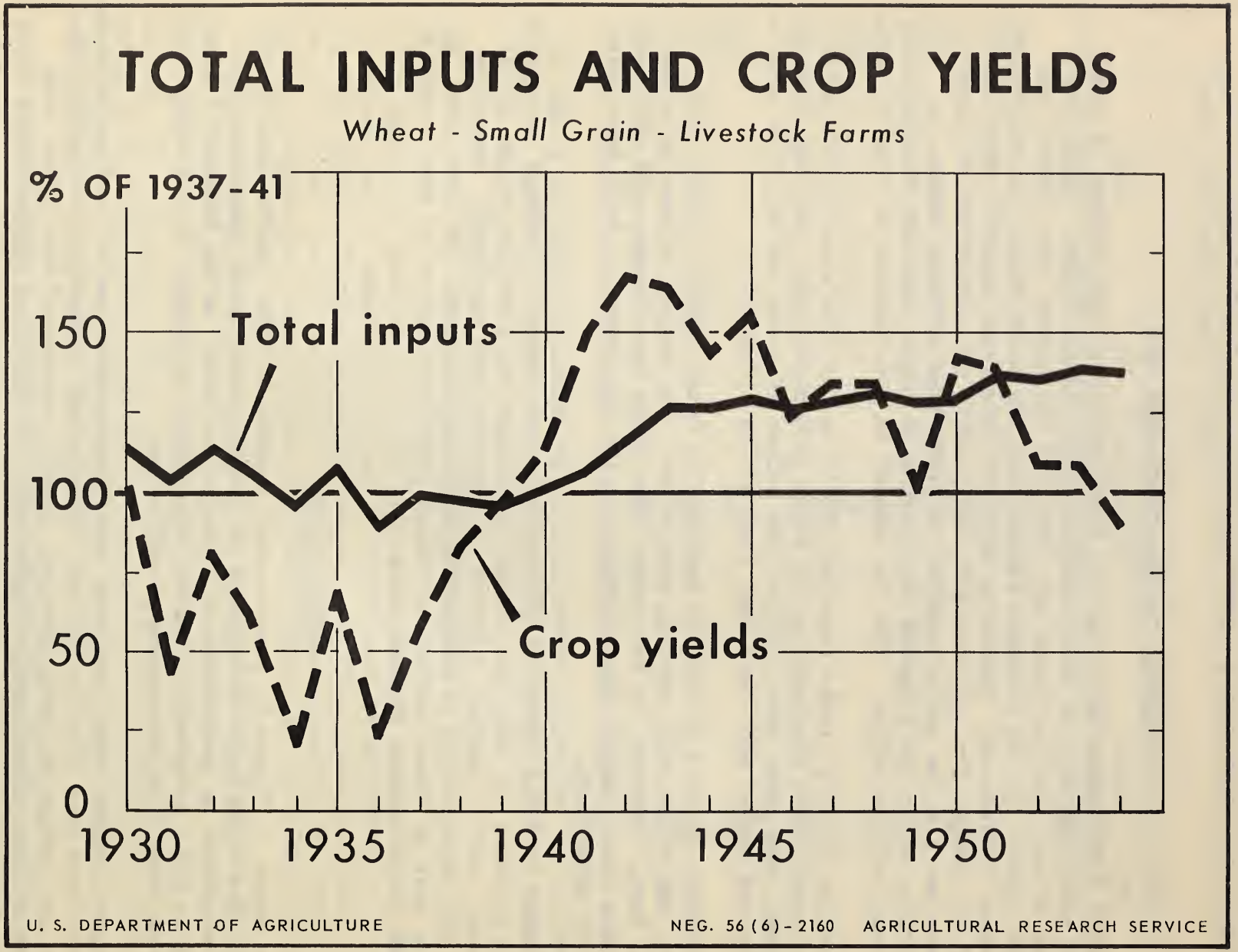

Figure 2.- Although the volume of goods and services used in production has remained fairly constant from year to year, the volume of production has fluctuated widely because of variations in crop yields in the Northern Plains.

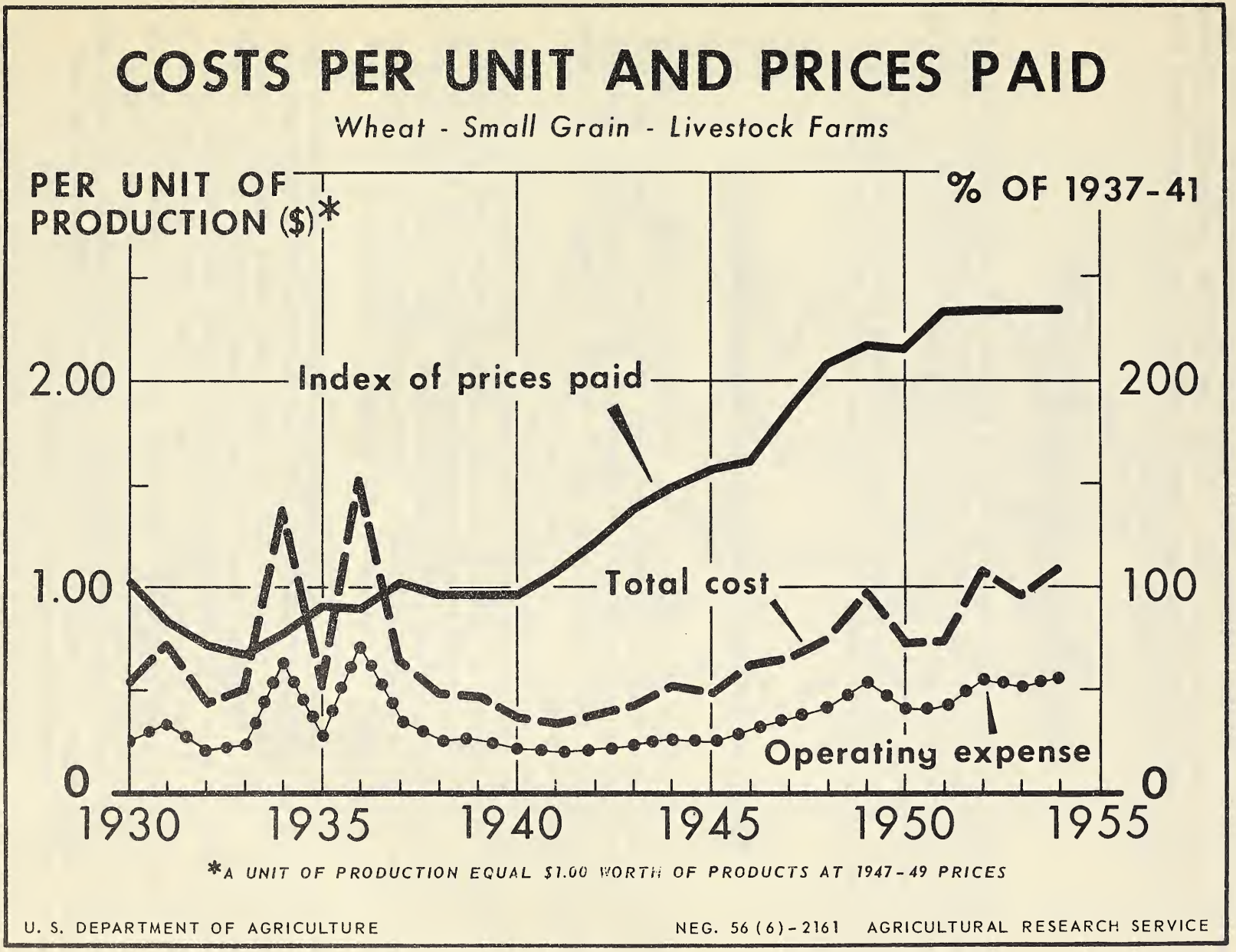

Figure 3.- Although both total costs and operating expenses per unit of production have risen rapidly since 1941, operating expenses rose less rapidly because some of the labor costs were shifted from hired labor to family labor. This shift tended to reduce operating expenses while it increased total costs.

Prices paid for goods and services rose sharply from the late thirties to the early fifties and thus were an important factor in the upward trend in costs per unit of production after 1940. Costs per unit of production, however, would have varied considerably over the last 25 years, even if prices paid for items used in production had remained constant.

Changes in Real Costs, and Efficiency, With Actual and Assumed Yields

Because of the wide fluctuation in crop yields and the considerable rise in prices paid for goods and services used in production, neither total cost nor operating expenses per unit of production are a good indication of what has happened to real costs; that is, the amount of labor, and the quantities of fuel, machinery, land, and other factors of production used to produce the crops and livestock on these farms, or what these costs would have been with normal yields.

Trends in Yield as They Affect Volume of Production and Costs

Variation in volume of production on crop farms is largely a function of yield, and costs per unit are closely related to volume. A large part of the cost of production is incurred before farmers have any basis for estimating prospective yields. The most likely yield can be estimated only in terms of some kind of normal yield.

Variations in weather and yields have been so great that it is difficult to measure the effects of weather and any other factors that may have affected yields. If precipitation and temperature were the only factors considered, the record for 1953 and 1954 would indicate high yields, but crop yields were low in these years. Yields of wheat, particularly, were low because of damage from rust. Durum wheat was damaged most severely.

Although in recent years yields have been much higher than during the 1930's, the trend in yields of wheat, barley, and oats has been downward since 1942 (fig. 4). Yields of oats, barley, and wheat rose sharply from the level of the 1930's to 1942. Most of the increase occurred in the 2 years from 1940 to 1942. It is unlikely that any factor other than weather could have affected yields so much in so short a time. Since 1942 new varieties of crops have been introduced, but these have been more in the nature of holding actions - new varieties that were resistant to new strains of rust - rather than varieties that raised the level of yields. More and larger tractors and machines also have helped to maintain yields by providing more thorough and more timely seedbed preparation, seeding, and harvest.

Despite these innovations, however, the trend in yields has been downward since 1942. These facts would appear to indicate that yield expectation has not changed significantly in the last 20 years. Perhaps for this area of

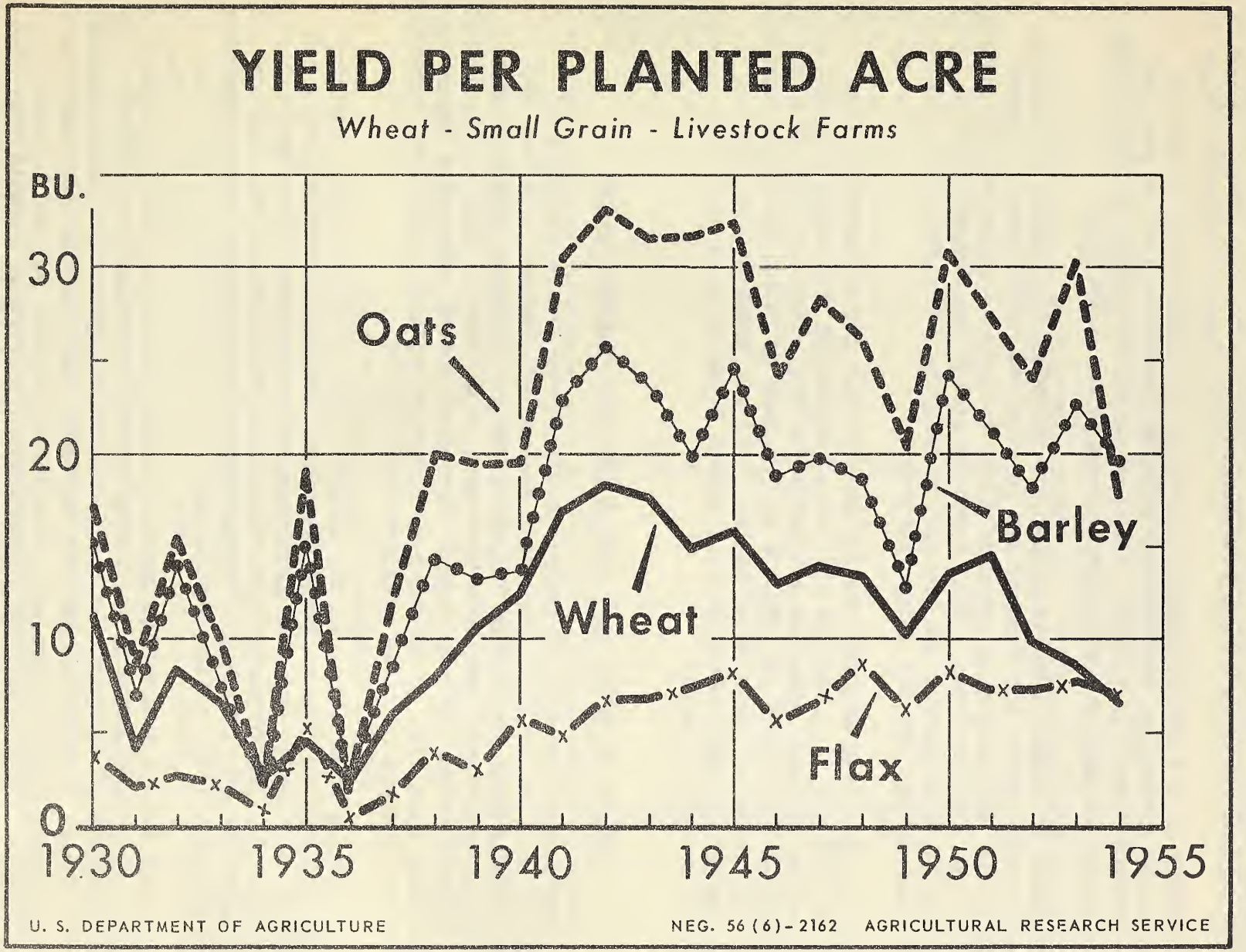

Figure 4.- Yields of all crops varied widely from year to year. Since 1942 yields of wheat have trended lower, while yields of oats and barley reflect a less pronounced downward trend, and yields of flax have risen.

highly variable yields, however, the 20-year period is too short and the weather too variable to permit this conclusion.

According to a study by Heisig, Ahrendes, and Merrick, 2/ yields of wheat are rising gradually, despite wide fluctuations from year to year and the long downward trend since 1942. Although trends in yields of other crops may follow a similar pattern, evidence on this point is lacking.

If yields of wheat in North Dakota are adjusted for annual deviations from normal precipitation and temperature in selected months over a longer period (1919-52), the resulting trend in yield is upward at the rate of about 0.12 bushels per acre per year. This trend in yields was demonstrated by Heisig, Ahrendes, and Merrick for the period 1919-44. More recently, the trend was recalculated for the longer period.

The average yield of wheat in the wheat-small grain-livestock area from 1935 to 1954 was 11.5 bushels per acre. Adjusting this average yield to the trend indicated above gives an estimated "normal" yield in 1935 of 9.76 bushels compared with 12.76 in 1955, or an increase of 3.0 bushels per acre in 20 years. Estimates of costs of producing wheat are presented on page 21. They show changes in costs based on this upward trend as well as on the assumption of constant yields.

Changes in Efficiency with Actual and Assumed Yields

An approximate measure of change in efficiency can be obtained if variations in cost per unit of production because of changes in prices and yields are eliminated. The second column in table 2 shows an index of what total costs per unit would have been each year from 1941 to 1954 if prices paid had been constant at the 1947-49 level. The third column shows what these costs would have been, if, in addition to constant prices, yields had remained constant at the average of those obtained from 1935-54.

In adjusting from actual to the assumed level of production, crop production was adjusted to what it would have been if 1935-54 average yields had been obtained each year. Rates of livestock production were not adjusted. Costs were not adjusted to reflect the changes in harvesting costs that are associated with changes in yields. Adjustments for harvesting costs, however, would have affected total costs very little.

With constant cost rates and actual yields, costs per unit of production rose about a third from 1941-43, the period of highest yields, to 1952-54. If yields had remained at the 1935-54 average level throughout this period and if prices had remained constant at the 1947-49 level, cost per unit of production would have declined about 12 percent. The latter measure may be the best measure of change in efficiency of production on the farm as a whole from 1941 to 1954. Thus, real costs per unit of normal production have decreased about

2/ Heisig, C. P., Ahrendes, E. H., and Merrick, D. E. Wheat Production in War and Peace. U. S. Bur. Agr. Econ. F.M. 48, 43 pp., illus. 1945. (Processed.)

Table 2.-Indexes of total input per unit of production at 1947-49 prices with actual yields and with 1935-54 average yields, wheat-small grain-livestock farms, Northern Plains, 1941-54

Index numbers, 1947-49=100

Year	Total input per unit of production with-	
	Actual yields	1935-54 average yields
1941	91	116
1942	87	116
1943	82	106
1944	90	104
1945	80	101
1946	99	103
1947	90	99
1948	91	100
1949	119	101
1950	90	105
1951	85	96
1952	118	105
1953	105	97
1954	120	96

1 percent a year. That is, the efficiency of production has increased about 1 percent a year since 1941. The increase in efficiency actually may be somewhat larger than this, if it is assumed that an upward trend similar to that for wheat exists in yields of other crops.

Relative Importance of Inputs and Price

In the 1930's, labor was relatively cheap compared with other factors used in production, but wage rates rose rapidly during World War II years. Meanwhile, the amount of labor used on these farms decreased about one-seventh from 1935 to 1954 (table 3). The quantity of machinery used (annual cost of its operation and depreciation in terms of 1947-49 prices) was low relative to the amount of labor used during the 1930's, but it increased about 60 percent from 1935 to 1954. Increased use of machinery more than offset the decreased use of labor, so that total inputs increased from the 1930's to the 1950's. Production also rose during this period, but total inputs rose nearly as rapidly and real costs per unit of normal production were reduced only slightly.

As indicated earlier, the quantity of machinery on these spring wheat farms has increased considerably since 1935. The nature of this increase has changed, however. In the late 1930's and early 1940's, most of the increase was in the form of additional tractors and machinery to be used with them. In

Table 3.-Labor, machinery and land: Cost rates and quantity used, wheat-small grain-livestock farms, 1930-54

Index numbers, 1937-41=100

Year	Cost rates			Wage rates as percentage of:	Quantity used 2/		
	Labor	Machinery	Land	machinery and land prices 1/	Labor	Machinery	Land
1930	109	97	166	83	119	107	101
1931	75	97	149	61	115	108	99
1932	59	92	128	54	123	101	98
1933	55	89	116	54	122	93	96
1934	62	92	115	60	112	86	95
1935	75	95	115	71	114	83	98
1936	77	97	115	73	101	83	94
1937	90	98	115	85	104	88	96
1938	92	102	112	86	102	96	98
1939	90	100	100	90	96	105	100
1940	97	98	86	105	98	103	102
1941	131	100	86	141	100	108	104
1942	187	106	88	193	105	123	107
1943	252	109	90	252	111	136	110
1944	280	112	109	255	109	131	114
1945	310	114	114	272	108	148	117
1946	308	117	129	250	103	156	120
1947	348	132	143	252	99	173	122
1948	367	155	171	225	96	196	125
1949	341	174	183	192	94	221	128
1950	334	177	177	189	93	236	130
1951	371	191	194	193	95	239	134
1952	375	198	221	179	95	261	135
1953	376	200	227	176	96	266	135
1954	369	202	224	173	97	266	137

1/ Index of wage rates divided by indexes of machinery and land prices weighted equally.

2/ Measured in terms of 1947-49 prices.

more recent years, particularly since 1950, besides acquiring more machines, farmers have replaced many older tractors and machines with larger models. This enables farmers to operate more land without additional hired help.

Consequently, farms in this area are likely to continue to increase in size until the acreage of land one family can operate with the larger equipment is more nearly the optimum acreage.

Changes in Total Farm Costs, with Assumed Charges for Operator and Family Labor and Capital

As indicated earlier, use of operator and family labor and land are not "expenses" in the usual meaning of the word. However, if farmers are to remain in business, the returns to these factors of production must meet some minimum standard of adequacy.

Three levels of return to operator and family labor and land are compared in estimating changes in cost per unit of production from 1947-49 to 1953-54. First, operator and family labor is charged at the wage rates for hired labor that are current in each period, and land is charged by multiplying its value in each period by the interest rate on real estate mortgages in the period. Second, operator and family labor is charged at 1947-49 farm wage rates and land is charged at 1947-49 value and interest rates. This is the method used in estimating changes in efficiency in the preceding section. Third, operator and family labor and land are charged in both periods at the rate of return earned in 1947-49. Yields are held constant at 1935-54 average yields.

Table 4 shows the cost computed for the first of these situations. If charges for operator and family labor are assumed to be equal to current wage rates and if charges for capital reflect the increase in prices of real estate and other assets, costs per unit of production increased about 11 percent from 1947-49 to 1953-54.

Estimated charges for the use of operator and family labor and management and for the use of land and other capital were higher in recent years than they were immediately after World War II. It may be argued that higher land values, particularly, are the result of higher incomes. Therefore, they should not be used as a basis for estimating costs. Changes in costs can be estimated while charges for operator and family labor and management and for capital are held constant. This is done in the second and third situations illustrated in table 5. When charges for operator and family labor are computed at the relatively high level it earned in the 1947-49 period, costs per unit are higher than they would have been had this labor been charged at hired wage rates. However, even though the charge for operator and family labor more than doubled, costs per unit increased by only a fourth. The relative change in cost per unit from 1947-49 to 1953-54 is about the same with operator and family labor at 1947-49 average wage rates and when this labor is charged at the rate of return earned in 1947-49. The increase of about 4 percent from 1947-49 to 1953-54 with both these methods is less than half as great as with the first method, under which cost rates for labor and capital reflect the changes that occurred in wages and capital costs.

Table 4.-Cost per unit of production with operator and family labor charged at current wage rates, and capital charged at current value times current interest rates, wheat-small grain-livestock farms, 1947-49 and 1953-54

Year	Gross farm production in 1947-49 dollars with 1935-54 average yields	Operating expenses at current prices	Charge for operator and family labor at current wage rates	Charge for capital at current value and interest rates	Total cost of production	Total cost per unit of production
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1947	10,085	4,142	2,124	1,187	7,453	0.74
1948	10,110	4,727	2,136	1,620	8,483	.84
1949	9,849	4,564	2,114	1,696	8,374	.85
1947-49 av.	10,015	4,478	2,125	1,501	8,104	.81
1953	11,077	5,295	2,557	2,281	10,133	.91
1954	11,081	5,145	2,550	2,294	9,989	.90
1953-54 av.	11,079	5,220	2,554	2,287	10,061	.91
Change from 1947-49 to 1953-54, percent						/12

Table 5.-Change in cost per unit of production with 3 levels of charges for operator and family labor and capital, and with production at 1935-54 average yields, wheat-small grain-livestock farms, 1947-49 to 1953-54

Basis of charges for operator and family labor and capital 1/	1947-49 average	1953-54 average	Change from 1947-49 to 1953-54
	Dollars	Dollars	Percent
Operator and family labor charged at current hired wage rates and capital charged at current value times current interest rates	0.81	0.91	/12
Operator and family labor charged at 1947-49 average hired wage rates and capital charged at 1947-49 average value and interest rates	.81	.84	/ 4
Operator and family labor and capital charged at the rate of return earned in 1947-49	1.08	1.12	/ 4

1/ Average hired wage rates were $0.91 per hour in 1947-49 and $0.96 in 1953-54. If use of capital is charged at 1947-49 value and interest rate, the return to labor used in 1947-49 was $2.07 per hour. Operating expenses were charged at current cost rates.

Actual costs per unit of production with prevailing yields and cost rates were about a third higher in 1953-54 than in 1947-49 (fig. 3). This change reflects higher prices for goods and services purchased, higher values of land, slightly higher charges for operator and family labor, and lower production in 1953-54 than in 1947-49. If these costs are adjusted as described in the preceding paragraphs, costs per unit rose only 4 percent during this period.

Both gross and net incomes on these farms were lower in 1953-54 than in 1947-49, but this was caused almost entirely by a drop in farm production and in prices received by farmers. Prices paid increased 15 percent. This increase caused only a 4-percent increase in total costs of production, because operating expenses are only about half the total costs and because improvements in efficiency were made during the period.

COST OF PRODUCING WHEAT

Changes in Cost of Production for the Farm as a Whole and for the Wheat Enterprise

Costs per unit (bushel) of wheat and cost per unit of production on the whole farm rose at about the same rate from 1937-41 to 1947-49 (table 6). Since then, the cost of producing wheat has risen faster than costs of producing other commodities on wheat-small grain-livestock farms of the Northern Plains.

Table 6.-Cost per unit of production for the whole farm and for the wheat enterprise, wheat-small grain-livestock farms, Northern Plains, specified periods

Index numbers, 1947-49=100

Item	1937-41	1947-49	1953-54
Cost per unit of production for:			
The whole farm	56	100	133
The wheat enterprise	58	100	201

Perhaps the chief cause of these differing rates of change is the difference in the level of yields of wheat and of other crops. From 1937-41 to 1947-49, yields of wheat rose less than yields of other crops on these farms (table 7). The period 1947-49 was one of relatively high yields for all crops. By 1953-54, yields of wheat had dropped 39 percent, whereas yields of all crops, including wheat, were down only 20 percent.

Table 7.-Yields of wheat and of all crops, and percentage of wheat seeded on fallow, wheat-small grain-livestock farms, Northern Plains, selected periods

Item	1937-41	1947-49	1953-54
Yield of wheat:			
Bushels per acre	10.6	12.3	7.6
Percentage of 1947-49 average yield	86	100	61
All crop yields, percentage of 1947-49 average	81	100	80
Percentage of wheat on fallow	68	39	59

An additional factor that caused changes in the cost per bushel of wheat to follow a somewhat different pattern from the cost per unit of all production on these farms is the difference in the proportion of wheat seeded on fallow and consequently the difference in the amount of cost of fallowing that is charged to the wheat enterprise. Following a series of dry years in the 1930's and with restrictions on acreage of wheat planted from 1938-41, about two-thirds of the wheat was seeded on fallow in 1937-41 (table 7). In 1947-49, following a series of years with ample moisture and no restrictions on acreage seeded, only 39 percent of the wheat was seeded on fallow. Because of restrictions on acreage seeded in 1954 and less moisture in the immediately preceding years, as compared with the 1940's, the proportion of wheat seeded on fallow rose to nearly 60 percent in 1953-54.

Changes in Operating Costs and in Total Costs of Producing Wheat

From 1937-41 to 1953-54, operating expenses rose nearly as fast as the total costs of producing wheat (table 8). The slight difference in the rate of change from 1947-49 to 1953-54 is caused by a shift from hired labor, which reduced operating expenses, to family labor, which tended to hold up total costs.

Cost of Producing Wheat - Actual and Assumed Yields

In 1953-54 the cost of producing a bushel of wheat on spring wheat-small grain-livestock farms was 3½ times as high as in 1937-41 and about twice as high as in 1947-49 (table 9). Costs per bushel rose nearly 75 percent from 1937-41 to 1947-49; they doubled from 1947-49 to 1953-54.

A part of these higher costs was caused by the higher prices paid for goods and services used in production. Prices rose rapidly from 1937-41 to 1947-49. In more recent years they have continued to rise at a less rapid rate. Equally important, so far as these variations in costs were concerned, was the

Table 8.- Total costs and operating costs 1/ per bushel of wheat, wheat-small grain-livestock farms, Northern Plains, selected periods

Item	1937-41	1947-49	1953-54
	Dollars	Dollars	Dollars
Cost per bushel:			
Total costs	0.87	1.50	3.01
Operating costs 1/	.48	.88	1.66
	Index numbers, 1947-49=100		
Cost per bushel:			
Total costs	58	100	201
Operating costs 1/	55	100	189

1/ Operating costs are cash expenditures, adjusted for change in inventory of machinery and equipment and buildings, chargeable to the wheat enterprise.

Table 9.-Cost of producing wheat at prevailing cost rates, wheat-small grain-livestock farms, Northern Plains, specified periods

Item	1937-41 average	1947-49 average	1953-54 average
Wheat planted per farm ..... Acres	148.4	222.5	203.5
Yield per planted acre ..... Bushels	10.6	12.3	7.6
Total production ..... do	1,573	2,746	1,557
Production at 1935-54 average yields 1/ ..... do	1,832	2,443	2,426
Total costs:			
Wheat (excl. fallow) ..... Dollars	953	3,291	3,191
Fallow (in preceding year) ..... do	419	816	1,494
Wheat and fallow ..... do	1,372	4,107	4,685
Total cost per bushel of wheat:			
With actual yields ..... do	.87	1.50	3.01
With 1935-54 average yields ..... do	.75	1.68	1.93

1/ Adjusted for differences in acres on fallow.

difference in yields in the three periods. In 1937-41, yields were a little below the 1935-54 average; in 1947-49, they were a little above the average; and in 1953-54, they were only two-thirds of the 20-year average.

All the increase in costs from 1937-41 to 1947-49 was the result of higher prices. During this interval, prices paid by these farmers doubled, but costs per bushel increased only 75 percent. Higher yields in 1947-49 and a slight increase in other efficiencies prevented costs per bushel from rising as fast as prices.

From 1947-49 to 1953-54, prices paid rose only about 15 percent, but the cost of producing a bushel of wheat doubled. The chief factor in the change in costs was the drop in the yield of wheat from 12.3 bushels per seeded acre in 1947-49 to 7.6 bushels in 1953-54. If costs are adjusted to what they would have been with the 1935-54 average yields, they more nearly follow the changes in prices paid. The increase in costs per bushel from 1937-41 to 1947-49, assuming 1935-54 average yields, actually exceeded the increase in prices paid because the charge for operator and family labor rose faster than prices paid for goods and services purchased. This charge is included in the cost of producing wheat, but is excluded from the index of prices paid. The implications of such a change in assumptions on costs and efficiency are explored in the following paragraphs.

Up to this point, normal yield has been interpreted as 1935-54 average yields. However, it would appear to be equally realistic to assume that the normal or expected yield of wheat in the wheat-small grain-livestock area has risen as a result of improvements in wheat varieties and practices used in wheat production. The trend in yield indicated by Heisig, Ahrendes, and Merrick 3/ shows increase in yields from improvements in practices, including increases in the proportion of wheat seeded on fallow. This trend could be used in comparing the costs of producing wheat with normal yields, if the increase in the proportion of wheat on fallow was at a uniform rate. As pointed out earlier, however, the proportion of wheat seeded on fallow was much higher in 1937-41 and 1953-54 than it was in the 1947-49 period. Data in table 10 show what the expected yield would have been for the proportion of wheat on fallow in each period and what the cost of production per bushel would have been if these yields had been realized.

With prevailing costs and practices and expected yields with normal weather, costs per bushel rose from $0.82 per bushel in 1937-41 to $1.82 per bushel in 1953-54. The sharpest rise in cost occurred during the decade from the late thirties to the late forties; some further rise has occurred in more recent years, but at a less rapid rate.

If costs are measured in 1947-49 cost rates, costs per bushel for expected normal yields declined from $1.92 in 1937-41 to $1.56 in 1953-54. This decline in costs at constant prices is a measure of change in efficiency in producing wheat. The decline in cost per bushel from $1.92 to $1.56 represents a decrease of 19 percent, or conversely an increase in efficiency of 23 percent from 1937-41 to 1953-54, or approximately 1.5 percent per year during the last 15 years.

3/ See footnote 2, p. 16.

Table 10.- Cost of producing wheat with prevailing practices, specified costs, and expected normal yields adjusted for differences in proportion of wheat on fallow, wheat-small grain-livestock farms, Northern Plains, selected periods

Item	1937-41	1947-49	1953-54
Yields per planted acre:			
Actual ..... Bushels	10.6	12.3	7.6
Normal 1/ ..... do	11.24	11.42	12.68
Total acres seeded ..... Acres	148.4	222.5	203.5
Total production ..... Bushels	1,668	2,541	2,580
Total cost of producing wheat:			
At prevailing cost rates ..... Dollars	1,372	4,107	4,685
At 1947-49 average cost rates ..... do	3,206	4,174	4,033
Cost per bushel for expected normal yields:			
At prevailing cost rates ..... do	.82	1.62	1.82
At 1947-49 cost rates ..... do	1.92	1.64	1.56

1/ Trend in yields based on method used by Heisig, Ahrendes, and Merrick (footnote 2, p. 16) adjusted for difference in proportion of wheat seeded on fallow.

The trend in yield has little effect unless the periods of comparison are separated by a number of years. The difference in costs was 20 cents a bushel from 1947-49 to 1953-54, based on normal yields as computed in table 10, compared with 25 cents if 1935-54 average yields are used (table 9).

In addition to the question of trends, there is the question as to which assumption provides the most accurate estimate of the present level of yields. The estimated normal yield for 1953-54, based on an upward trend, is somewhat higher than the 1935-54 average. It can be argued, however, that even though these trends in yields exist, the years from 1935 through 1954 represented a period of better than average weather. In general, neither the level of cost estimates in the postwar period nor the changes in the estimates are affected significantly by whether the 1935-54 average, or the estimated yield adjusted for variations in precipitation and temperature is assumed to be the better estimate of normal yields.

Cost-Price Comparisons

Comparison of costs per unit with prices received can lead to erroneous conclusions. The assumptions in such comparisons must be given careful attention. As pointed out earlier, only about half the estimated cost of production on these wheat farms is made up of direct cost items. The rest consists of

charges for operator and family labor and land. In many situations, the level of charges for these factors depends upon the judgment of the person allocating the costs. For example, the charge for the use of land frequently is based on the value of land times the current interest rate. The value of land in turn depends partly on the net return to land, or the difference between the value of product and expenses. If value of land is based partly on cost of production, it is not consistent to base cost of production on value of land.

As may be observed in table 11, prices received for wheat rose faster than costs per bushel from 1937-41 to 1947-49. Higher yields in the latter period were important in retarding the increase in cost per bushel. At the same time, higher yields, higher prices, and good incomes caused farmers and others to bid up the price of land and to invest in more machinery.

Table 11.-Support prices, prices received, and costs of wheat, selected periods

Item	1937-41	1947-49	1953-54
	Dollars	Dollars	Dollars
U.S. support price per bushel	1/0.71	1.93	2.22
Season average price per bushel received by farmers, U.S.	2/ .76	2.05	2.09
Season average price per bushel received by farmers, North Dakota	.75	2.17	2.22
Cost per bushel with 1935-54 average yields, wheat-small grain-livestock farms:			
Owner-operated farms	.75	1.68	1.93
Tenant-operated farms	.86	2.02	2.24

1/ 1938-41 average. No support program for 1937 crop.
2/ Season average price for 1938-41 was $0.71 per bushel.

Since 1947-49, prices received by farmers for wheat have risen only about 2 percent, but cost per bushel on owner-operated farms has risen about 15 percent, assuming a constant level of yields of wheat. Costs have risen about 11 percent if estimated yields with normal weather are used.

Cost per bushel on tenant-operated farms rose further from 1937-41 to 1953-54. However, when compared with the increase in costs on owner-operated farms, more of the increase on tenant-operated farms occurred before 1947-49 (table 11).

Cost-Price Margins and Land Values

The charge for the use of land on tenant-operated farms based on the net value of the crop with the usual rental arrangements reflects a higher return to land than the interest on investment on owner-operated farms. With average yields and prices for wheat at the 1953-54 level, farm operators and prospective landlords could be expected to bid up land prices still further. The lowering of support prices may retard the rise in the price of land. With stable prices for wheat, however, the price of land probably would be higher than it would with uncertain prices for wheat, which would average as high as support prices.

Other factors will tend to influence in different ways the trends indicated above. Crop yields in this area are unstable. This analysis is based on 1935-54 average yields. Several years of low yields could reduce the ability or the desire of farmers to bid more for resources. A succession of years with high yields would tend to encourage more spirited bidding for available land and other resources.

Wheat is not the only product on these farms, and it is seldom the only product on any farm. Other crops and livestock may provide margins of profits, or losses, that will affect farmers' net incomes and the returns to land.

The value of farmland is affected also by returns from other kinds of investments. If the rate of return per dollar invested in other industries declines, some investors might shift their investments to land, provided returns from this source appear to be more profitable. Such an increased demand for land would tend to force the prices of land still higher. Conversely, higher rates of returns from investments in other industries would reduce the demand for land, even though net returns per acre remain unchanged.

Changes in Costs and in Support Prices

From 1947-49 to 1953-54, costs of producing wheat rose less than the increase in the support price. Costs on owner-operated farms in this area rose from $1.68 per bushel to $1.93, or 25 cents a bushel. On tenant-operated farms, costs rose 22 cents a bushel. During this period also, the U. S. average support price for wheat rose 29 cents a bushel. However, in 1947-49 the market price for wheat was well above the support level so the price received by farmers in North Dakota rose 5 cents a bushel from 1947-49 to 1953-54.

A conclusion that may be drawn from these data is that the decrease in income on these spring wheat farms from 1947-49 to 1953-54 was caused partly by the disappearance in the spread between the price received for wheat and the support price. Cost per unit of production also rose during this period, but the support price rose even more. To the extent that the

support price represents a normal relationship between prices and costs, this relationship remained favorable to farmers, or even improved slightly from 1947-49 to 1953-54. Low yields in 1953-54 also reduced incomes below what they would have been with the normal yields assumed in this analysis.

Changes in Cost of Producing Wheat With Specified Charges for Operator and Family Labor, and Capital

Much of the cost of producing wheat consists of charges for operator and family labor and management and for the use of capital. Normally, earnings above operating expenses compensate for these resources. Any level of charges for the use of these resources is more or less arbitrary. One method of evaluating these resources is to charge current hired wage rates for labor and prevailing interest rates for capital. However, if charges for these resources are made at a constant rate over a period of years, the resulting change in total costs during the same period may be less subject to question.

In effect, this is what was done in table 12. Operating expenses and other costs, except charges for operator and family labor and management and land, were charged to the wheat enterprise at prevailing cost rates in 1947-49 and in 1953-54. Charges for operator and family labor and land were charged at 1947-49 average rates. With this method of computation, the increase in the cost of producing wheat from 1947-49 to 1953-54 was 12 cents a bushel. This is comparable to an increase in costs of 25 cents a bushel, if all costs in 1953-54 are charged at prevailing cost rates. (See table 9.) In both instances, costs are figured on the basis of 1935-54 average yields. Therefore, any difference in costs per bushel is caused by higher prices paid. It is partly offset by a slight improvement in efficiency.

Comparison of Cost Methods

Frequently, agricultural economists are asked to answer the question: What is the cost of producing wheat? The inquirer usually has a specific purpose in mind in asking this question, but he may be unaware of the limitations of such an estimate. Even assuming that it were possible to estimate the average cost of producing wheat, still half the wheat would be produced at above-average costs and more than half the producers would be producing at above-average costs.

In addition, several estimates of costs could be made depending on the conditions under which wheat is produced or the area to which the costs apply. For example, a variety of cost levels could be estimated depending on whether they represent those of all producers, commercial producers, commercial family-operated farmers, owner-operators or tenant-operators, or producers of hard spring wheat, hard winter wheat, or soft winter wheat. Furthermore, the estimates of costs would depend on the level of charges assumed for the use of land and for operators and family labor and management.

Table 12.-Cost of producing a bushel of wheat, with charges for operator and family labor and land at 1947-49 level and assuming 1935-54 average yields, wheat-small grain-livestock farms, Northern Plains, 1947-49 to 1953-54

Item	1947-49	1953-54
	Dollars	Dollars
Enterprise Costs		
Operating expenses at prevailing prices	2,403	2,574
Value of homegrown seed at prevailing prices	653	613
Value of horse work, at prevailing cost rates	85	54
Charge for operating capital at prevailing values and interest rates	196	346
Charge for land at 1947-49 average values and interest rates	365	382
Value of operator and family labor and management at 1947-49 average wage rates ($0.91 per hr.)	419	523
Total costs	4,121	4,492
	Bushels	Bushels
Production at 1935-54 average yields	2,443	2,426
	Dollars	Dollars
Cost per bushel	1.69	1.85

Assuming that one of these situations is selected for the purpose at hand, several methods are available with which to evaluate a charge for land and for operator and family labor and management. Some of these methods are shown in table 13 for commercial family-operated farms - the most common size and kind of farm in the area. The lowest cost shown here for 1953-54 is $1.56 a bushel, if a prorated share of actual operating expenses, operator and family labor charged at 1947-49 average wage rates for hired labor, and land cost based on 1947-49 average value and interest rate are charged to the wheat enterprise, and if half the cost of fallowed land is charged to wheat and 1935-54 average yields are assumed. At the other extreme, the cost is $3.01 a bushel, if prevailing operating expenses, operator and family labor, and land are charged to the actual production of wheat in 1953-54. A large part of this high cost per bushel was caused by low yields in this period. If normal yields are assumed, the range in costs is from $1.56 to $2.24 a bushel.

The highest cost calculation of those illustrated in table 13 is based on the cost of producing the tenant's share of the wheat on tenant-operated farms. The tenant retains two-thirds of the wheat. All operating expenses and all labor are charged at prevailing cost rates. Two-thirds of the seed is charged to the tenant. No charge is made for the use of land but all other costs (excluding the costs usually paid by the landlord) are charged against the tenant's share of the wheat produced. Under this method and assuming average yields, the cost of producing a bushel of wheat in 1953-54 was $2.24. A variation of this method is to charge the value of the landlord's share of the wheat as a cost. However, this method is less defensible because the cost of the product would depend directly on the price of the product.

Table 13.-Total cost of producing a bushel of wheat at various levels of cost rates and yields, commercial family-operated wheat-small grain-livestock farms, 1947-49 and 1953-54

Item	1947-49	1953-54
	Dollars	Dollars
Prevailing cost rates:		
A. All costs of fallowed land charged to wheat-		
1. Owner-operated farms, prevailing yields	1.50	3.01
2. Owner-operated farms, 1935-54 average yields	1.68	1.93
3. Tenant's share of wheat on tenant-operated farms 1935-54 average yields	2.02	2.24
B. Half of cost of fallowed land charged to wheat-		
4. Otherwise the same as 2	1.51	1.62
Adjusted cost rates and 1935-54 average yields:		
A. All costs of fallowed land charged to wheat-		
5. Current operating expenses, operator and family labor and land charged at 1947-49 rates	1.69	1.85
6. Same as 5, plus a charge for management at 7 percent of the value of net production	1.82	1.99
7. Same as 5, except operator and family labor charged at rate of return earned in 1947-49	1.90	2.12
B. Half the cost of fallowed land charged to wheat-		
8. Otherwise the same as 5	1.52	1.56
9. Otherwise the same as 6	1.65	1.69
10. Otherwise the same as 7	1.71	1.78

Where wheat is grown on fallowed land, the question arises of how much of the cost of fallowing should be charged to the wheat enterprise. The answer depends on the purpose of fallowing and whether all the benefits of fallowing accrue to the crop that follows immediately. In the spring wheat-small grain-livestock area of north-central North Dakota, farmers frequently fallow to control weeds. When this is the chief purpose of fallowing, the reduced weed infestation is beneficial to crops for several years. Although fallowed land normally is planted to wheat, under these circumstances the whole cost of fallowing should not be charged to the wheat enterprise.

As in many other allocations of costs, the proportion of the cost of fallowing charged to the wheat enterprise depends in part on judgment. Throughout most of this analysis, all of the costs of fallowing have been charged to the wheat enterprise, but if half instead of all costs of fallowing are charged to wheat, the cost per bushel with average yields is reduced from $1.93 a bushel in 1953-54 to $1.62 a bushel.

Although the level of costs estimated by these different methods varies widely, the variation in the changes in costs from 1947-49 to 1953-54 is relatively small, if normal yields are assumed for both periods. Depending on the method used, costs increased from 2 to 15 percent during the period. The smaller increase results from assuming charges for operator and family labor and land at 1947-49 levels and charging half the cost of fallowing to wheat. The 15-percent increase is based on charges for these factors at the rates that prevailed in each period and charging all the cost of fallowing to the wheat enterprise.

EFFECT OF VOLUME OF PRODUCTION ON COSTS

On farms where the volume of production varies greatly from year to year, costs per unit of production also vary widely. Year-to-year changes in prices paid for goods and services used in production usually are not great. However, over a longer period of time, changes in prices paid may be greater than changes in production. Changes in cost per unit of production of one product because of changes in volume of production may be more closely associated with changes in production on the farm as a whole than with changes in the size of the given enterprise.

Relation of Volume to Cost at the Farm Level

One way of showing the relation of volume of production to cost per unit is to compare cost, excluding change in price, with volume of production. This is done in figure 5. "Inputs" are costs at constant prices; in this instance, 1947-49 average prices were used.

Because many cost items are fixed or are incurred before an estimate of production can be made, there is little opportunity to reduce costs in years when production is low. As a result, the cost per unit increases in almost direct proportion to the decrease in production. There is some saving in costs of harvesting so that when production was cut in half, from 100 (1947-49=100) to 50, the cost per unit of production increased from about 95 to 162, or only about 70 percent.

Relation of Volume to Cost at the Enterprise Level

A change in the size of one enterprise does not necessarily result in a change in the cost per unit of production. One enterprise may be expanded at the same time that another enterprise with similar production requirements is contracted. However, deviations from normal rates of production may cause a change in costs per unit of production in any one year.

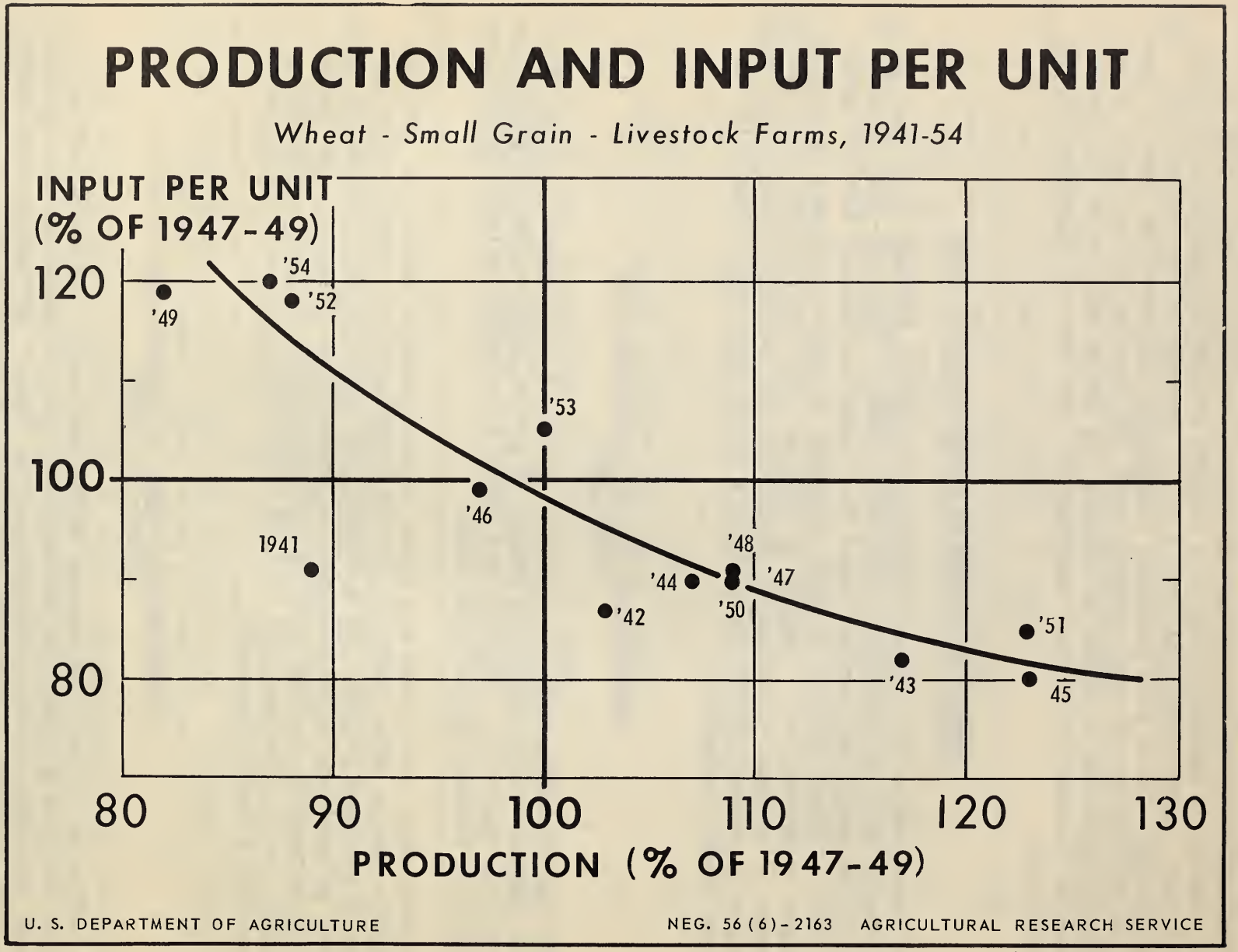

Figure 5.- An inverse correlation exists between volume of production and inputs per unit of production, because most costs are fixed in any one year.

Thus, changes in costs per unit of production may be small when one crop is substituted for a similar crop. However, if some land is taken out of small grain and used for row crops, or vice versa, or taken out of crops and used for pasture, costs per unit of production in the enterprise that is contracted usually increase.

A shift from wheat to other small grains and flax affects the cost per unit of production of either crop very little, because production requirements of these crops are similar. When production controls are imposed on one crop, such as wheat, and farmers are free to shift use of the released acreage to other similar crops, the costs are not affected materially by the decrease in production of wheat.

Effects of Production Controls on Costs

Since 1949, production controls on wheat have been imposed twice. Restrictions were applied to the 1950 crop, but as they were removed before the end of the crop year they were not wholly effective at that time. In 1954, production controls were again imposed in the form of acreage allotments and marketing quotas. These changes from complete freedom as to the acreage to be planted to forced reductions in acreage provide an opportunity to study the changes in costs that followed a sharp reduction in acreage of wheat.

From 1949 to 1950, operators of spring wheat-small grain-livestock farms in the Northern Plains reduced their acreage of wheat about 24 percent. Again in 1954, the acreage of wheat on these farms was reduced by 20 percent.

In adjusting to the allotment program, spring wheat farmers, to a large extent, shifted from production of wheat to production of other small grains and flax. A small acreage was taken out of crops entirely in 1950 and again in 1954 (table 14). Also, in 1950, the acreage of land fallowed was somewhat larger than in 1949. In 1954, however, acreage fallowed was somewhat smaller than in 1953. In both 1950 and 1954, the proportion of wheat on fallow increased from the preceding years largely because the reduction in acreage of wheat occurred on other than fallow land.

Acreage allotment programs for wheat, as they were carried out, did not significantly affect the cost of producing wheat on spring wheat farms in the Northern Plains. Farmers shifted from production of wheat to other crops for which the same machinery could be used. Also, they used about the same amount of labor and the same quantities of fuel and other materials per acre. As the shift in production required no additional investment and as volume of production on these farms was not affected materially by this shift, costs per unit of production were unchanged. However, changes in yields and, to a lesser extent, changes in prices paid by farmers and charges for operator and family labor and capital tend to obscure the effects of changes in acreage of wheat on costs of production.

Table 14.- Changes in use of cropland following wheat acreage allotments, wheat-small grain-livestock farms, Northern Plains, selected years

Item	1949	1950	1953	1954
	Acres	Acres	Acres	Acres
Total acreage in farm	634	647	671	680
Cropland (incl. hay)	515	502	550	541
Wheat seeded	241	187	225	182
Wheat on fallow	90	94	129	112
Fallow	94	116	112	103
	Percent	Percent	Percent	Percent
Percentage of all land in wheat	38.0	28.9	33.5	26.8
Percentage of wheat on fallow	37	50	57	62

Actual costs per bushel declined from the preallotment year 1949, to 1950 (table 15). In 1950 yields per planted acre averaged 13.6 bushels per acre compared with 10.1 bushels in 1949. In 1954, however, costs per bushel were much higher than in 1953 when production was unrestricted, but yields in the latter year averaged only 6.6 bushels per acre compared with 8.5 the year before.

If yields are adjusted to reflect the yields that might be expected under normal growing conditions, the difference in costs per bushel with and without restrictions on production of wheat is insignificant. Cost rates in 1953 and 1954 were somewhat higher than they were in 1949 and 1950. But if costs are adjusted to reflect 1947-49 average cost rates as well as normal yields, costs per bushel of wheat are approximately the same for each of the 4 years.

Although cost of production per bushel of wheat was not affected by restrictions on production of wheat on these farms, it does not follow that farm incomes were not adversely affected; neither can the conclusion regarding costs be applied to other types of farms or to wheat farms in other areas. In shifting from higher to lower valued crops, incomes normally would be reduced even if costs remained unchanged. On many types of farms, production cannot be shifted from one crop to another without reducing the total production of the farm, or without additional investment in machinery or materials, or less profitable use of operator and family labor.

Data are not available to show variations in the cost of producing wheat among farms. In addition to variations in costs that arise from variations in yields and production, as shown in figure 5, costs also vary by size of farm, method of production, quality of land, and skill of management. The range in costs on individual farms probably would be at least as great as the range shown in table 13 or in figure 5.

Table 15.- Effect of wheat acreage allotment on the cost of producing wheat, wheat-small grain-livestock farms, Northern Plains, selected years

Item	1949	1950	1953	1954
Wheat:				
Planted .....Acres..	240.8	186.6	225.1	182.0
Production .....Bushels..	2,431	2,530	1,917	1,197
Production at 1935-54 average yields.....do ..	2,629	2,151	2,662	2,190
Cost of production .....Dollars..	4,546	3,895	5,221	4,287
Costs at 1947-49 average cost rates .....do ..	4,314	3,592	4,373	3,530
Cost per bushel of wheat at:				
Prevailing yields and cost rates .....do ..	1.87	1.54	2.72	3.58
1935-54 average yields and prevailing cost rates .....do ..	1.73	1.81	1.96	1.96
1935-54 average yields and 1947-49 cost rates .....do ..	1.64	1.67	1.64	1.61
Operator and family labor used on the whole farm .....Hours..	2,390	2,380	2,620	2,670

COMPOSITION OF THE COSTS OF PRODUCING WHEAT

To an individual farmer, operating expenses and the value of seed wheat are the chief items of cost. These are out-of-pocket expenses that must be met. Operating expenses include depreciation on machinery and buildings, taxes, and other fixed charges. Depreciation may be deferred for a year or two, although ordinarily these costs must be met each year in terms of either replacement costs or repairs. Usually, other fixed expenses must be paid currently.

The charge for operator and family labor represents an opportunity cost. In most of this report, the charge for this labor is equal to the earnings of hired labor in the area. Presumably, operator and family labor was worth as much on the operator's farm as on any other.

Charges for operating capital are real, though not necessarily cash, costs. The equipment represented by this capital is necessary to the operation of the farm. Unlike the charge for land, the charge for operating capital applies to all farms whether owned or rented and regardless of when the operator began farming. Some farmers avoid a part of this charge by hiring machinery. This procedure reduces the charge for capital, but it does not necessarily reduce operating expense or total costs.

The charge for land is perhaps the least satisfactory of those shown in table 16. When the land charge is based on mortgage interest rates, it is

Table 16.-Composition of costs per bushel of wheat produced, assuming 1935-54 average yields, wheat-small grain-livestock farms, Northern Plains, selected periods

Production and cost items	1937-41		1947-49		1953-54	
	Amount	Percentage of total	Amount	Percentage of total	Amount	Percentage of total
	Bushels	Percent	Bushels	Percent	Bushels	Percent
Total production	1,832		2,443		2,426	
	Dollars		Dollars		Dollars	
Hired labor	0.07	10	0.20	12	0.13	7
Other variable operating expenses	.21	28	.51	30	.55	28
Fixed operating expenses	.13	17	.27	16	.38	20
Total operating expenses	.41	55	.98	58	1.06	55
Value of homegrown seed	.07	9	.27	16	.25	13
Value of horse work	.08	11	.03	2	.02	1
Value of operator and family labor and management	.05	7	.17	10	.23	12
Charge for operating capital	.04	5	.08	5	.14	7
Charge for land	.10	13	.15	9	.23	12
Total	.75	100	1.68	100	1.93	100

below what tenant farmers are paying on crop-share leases. Operating expenses on rented farms are somewhat lower than those on owner-operated farms, as taxes, depreciation, and repairs on buildings and fences, some of the insurance, and part of the seed or harvesting costs are paid by the landlord. However, total costs per bushel of the tenant's share of the wheat are higher. (See table 13.)

The assumed charge for land for the 1953-54 period is too high for owner-operators, except for those who bought farms at 1953-54 or higher prices. The average land charge in 1953-54, assuming 1935-54 average yields, was $0.23 per bushel of wheat. However, for farmers who bought their farms in 1937-41 or 1947-49, at the average prices that prevailed in those years, the land charge would be $0.10 or $0.15, respectively. For most owner-operators of 1955, the

land charge is somewhere between the low of $0.10 per bushel for those who bought their farms in the low period of 1937-41 and the high of $0.23 per bushel for those who bought farms in the last few years.

Changes in Composition of Costs

The relative importance of cash and noncash costs on debt-free owner-operated farms has not changed appreciably since 1935. Operating expenses made up about 55 percent of the total cost in 1937-41 and in 1953-54. (See table 16.) Because of the higher prices received for wheat in recent years, the value of homegrown seed has become relatively more important. Similarly, the rapid rise in wage rates has caused the charge for operator and family labor to be a larger part of total costs.

Changes in Cost Rates, Technology, and Use of Resources

Some important changes have occurred among individual cost items. Prices of some have increased more rapidly than those of others. For example, wage rates have risen faster than land values and the resulting increase in value of operator and family labor is greater than the increase in the charge for use of the land.

If the effect of changes in price is eliminated from these comparisons, some changes in the quantities of several items are also apparent. An estimate of the change in the quantity of these goods and services used can be obtained when these costs are adjusted to constant prices. On this basis, operating expenses in 1953-54 were 56 percent of total costs, compared with 49 percent in 1937-41 (table 17). Operator and family labor increased from 10 percent of total costs in 1937-41 to 13 percent in 1953-54, while hired labor, which is included in operating expenses, decreased from 16 to 8 percent of total costs.

Most of the operating expenses are expenditures for items that farmers buy from nonfarm sources. If hired labor, feed, and seed (services and goods obtained largely from other farms) are subtracted from operating expenses, the rest represents goods and services from nonfarm sources. In 1937-41, only 29 percent of total inputs (costs at constant prices) were obtained from nonfarm sources, but by 1953-54 they comprised 43 percent of total inputs (fig. 6).

Nonfarm inputs are more important on wheat-small grain-livestock farms than on many other types of farms. Figure 6 shows the change in the proportion of total inputs obtained from nonfarm sources on wheat-small grain-livestock farms, compared with four other important types of farms in the country. On only one of the other four types of farms is the proportion of purchased inputs as high as on wheat-small grain-livestock farms.

An equally important change has taken place in the composition of the goods and services farmers buy or hire. These are shown in table 18, in terms of 1947-49 prices. Hired labor accounted for 31 percent of all inputs bought by these wheat farmers in 1937-41. By 1953-54, hired labor made up only 14 percent of the total. Power and machinery, which made up 49 percent of cash

Table 17.-Composition of inputs (costs at 1947-49 prices) used in producing wheat, wheat-small grain-livestock farms, Northern Plains, selected periods

Item	Percentage of total costs		
	1937-41	1947-49	1953-54
	Percent	Percent	Percent
Total operating expense	49	58	56
Operating expense, excluding hired labor	(33)	(46)	(48)
Hired labor	(16)	(12)	(8)
Value of homegrown seed	12	16	15
Value of horse work	16	2	1
Value of operator and family labor and management	10	10	13
Charge for operating capital	4	5	6
Charge for land	9	9	9
Total	100	100	100

inputs in 1937-41, rose to 68 percent in 1953-54. The proportion of other cash inputs did not change appreciably during the period.

To a large extent, the change in purchased inputs was simply a replacement of hired labor with machinery. In 1937-41, hired labor and power and machinery together comprised 80 percent of all purchased inputs. Despite a considerable shift between these two groups of cost items by 1953-54, together they comprised 82 percent of cash inputs in the latter period.

Table 18.-Change in composition of operating expenses (at 1947-49 average prices) charged to the wheat enterprise, wheat-small grain-livestock farms, Northern Plains, selected periods

Item	1937-41	1947-49	1953-54
	Percent	Percent	Percent
Hired labor	31	21	14
Crop expense	10	8	8
Power and machinery expense	49	63	68
Taxes paid	9	7	8
Building and overhead expense	1	1	2
Total	100	100	100

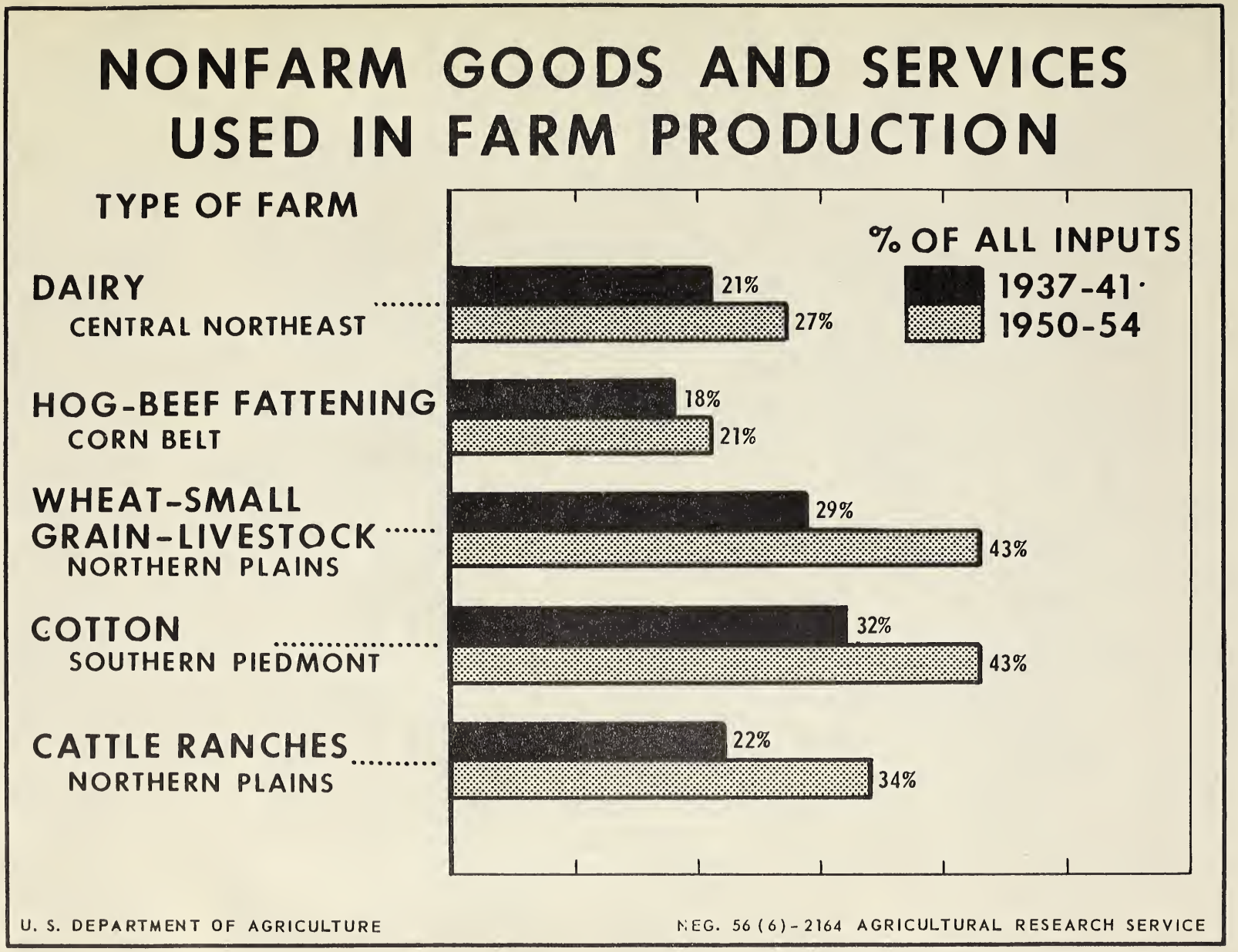

Figure 6.- The increase since 1937-41 and the recent level of nonfarm goods and services used in production have been greater on wheat-small grain-livestock farms than on several other important types of farms in the United States.

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